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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/694,359

10/28/2003

Toshifumi Mori

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10/04/2004

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EXAMINER

LE, THAO P

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/694,359

Applicant(s)

MORI, TOSHIFUMI

Examiner

Thao P. Le

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/28/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/5/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledge is made of applicants' claim for foreign priority base on an application 2002-314329 filed in Japan on 10/29/02.

Information Disclosure Statement

2. Information Disclosure Statement (IDS) filed on **October 12, 2000** and made of record. The references cited on the PTOL 1449 form have been considered.
3. Claims 1-20 are pending in this application.

Object to drawings

4. Figures 1A-1E should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-4, 11-12, 19-20 are rejected under 35 USC 102 (e) as being anticipated by Joo et al., U.S. Patent No. 6,627,494.

Regarding claims 1,2, Joo et al. discloses a method for fabricating a semiconductor device comprising the steps of:

- . forming a film containing a silicon 4 above a semiconductor substrate 1;
- . removing a natural oxide film on the surface of the film (lines 51, 59, Col. 6);

forming an oxide film 5 on the surface of the film with the natural oxide film removed (TaON, lines 13-14, Col. 6);

forming a mask on the oxide film and etching the film with the mask to form a gate electrode including the film (Figs. 1-2).

Regarding claims 3-4, Joo discloses the step of etching the oxide film with the mask and etching the oxide film after forming the mask.

Regarding claims 11-12, Joo et al. discloses the step of removing the natural oxide film using HF acid (lines 51-53, Col. 6).

Regarding claims 19-20, Joo discloses the film is polysilicon.

7. Claim 17 is rejected under 35 USC 102 (e) as being anticipated by Lee et al., article submitted by applicant as IDS.

Regarding claim 17, Lee et al. discloses a method for fabricating a semiconductor device comprising the steps of: forming a film containing a silicon (poly-Si) above a substrate; forming a mask ($\text{Si}_x\text{O}_y\text{N}_z$) on the film without exposing the surface of the film to the atmosphere (formed by PECVD, within a chamber); and etching the film with the mask to form gate electrode including the film (page 131).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joo et al., U.S. Patent No. 6,627,494, in view of Houngh et al., U.S. Patent No. 6,689,645.

Regarding claims 5-8, Joo et al. fails to disclose the step of forming the oxide film by oxidizing the surface of silicon-containing film with an oxidizing chemical liquid such as HPM, SPM, aqueous solution of ozone or nitric acid. Houngh et al. discloses the step of cleaning the surface of silicon-containing film to remove native oxide and then oxidizing the native-oxide-free surface of the film with HPM to form oxide layer on the film. It would have been obvious to one having ordinary skill in the art to use the method of forming the oxide layer as taught by Houngh et al. in Joo et al. if the oxide film in Joo et al. is silicon oxide instead of TaON, and it would have been obvious to one having ordinary skill in the art to use the method of Houngh et al. in order to obtain high quality and low cost oxide layer.

10. Claims 9-10, 13-16, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joo et al., U.S. Patent No. 6,627,494.

Regarding claims 9-10, Joo et al. fails to disclose the step of forming oxide layer by exposing the film to oxygen plasma. However, it is obvious to one having ordinary skill in the art to form oxygen layer using oxygen plasma because using plasma, the thickness of the oxide layer can be controllable and the number of method steps is reduced.

Regarding claims 13-16, Joo et al. doesn't disclose the step of removing foreign objects adhering to the surface of the film before removing the natural oxide film. However, it is conventional and well known in the art that foreign objects adhering to the surface of the film is obviously removed before the step of removing the natural oxide film in order to avoid side reactions and residues and maximize the removal of native oxide.

Regarding claim 18, Joo et al. discloses a method for fabricating a semiconductor device comprising the steps of:

- . forming a film containing a silicon 4 above a semiconductor substrate 1;
- . removing a natural oxide film on the surface of the film (lines 51, 59, Col. 6);
- . forming an oxide film 5 on the surface of the film with the natural oxide film removed (TaON, lines 13-14, Col. 6);
- . forming a mask on the oxide film and etching the film with the mask to form a gate electrode including the film (Figs. 1-2).

Joo et al. fails to disclose the step of forming a resist on the mask and exposing the resist to light having a wavelength of 200 nm or below to form a resist pattern. It is conventional in the art that a resist pattern is formed on the mask to determine the pattern of the layers to be etched. Exposing the resist layer under light at a wavelength of 200 nm or below would have been a matter of obviousness. The selection of such parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, wavelength, etc.**, would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art.

"Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, wavelength etc.**, or in combination of the parameters would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao P. Le whose telephone number is 571-272-1785. The examiner can normally be reached on M-T (7-6).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 10/694,359
Art Unit: 2818

Page 9

A handwritten signature in black ink, appearing to read 'Thao P. Le'. The signature is written in a cursive, flowing style with a large initial 'T'.

Thao P. Le
Examiner
Art Unit 2818
Sept. 29, 2004.